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EXAMINER	
LEE, HSIEN MING	
ART UNIT	**PAPER NUMBER**
2823	

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Please find below and/or attached an Office communication concerning this application or proceeding.

EV

Office Action Summary	**Application No.** 10/678,883	**Applicant(s)** HALLER ET AL.	
	Examiner Hsien-ming Lee	**Art Unit** 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8,10-16 and 19-21* is/are rejected.

7)☒ Claim(s) *5-7,9,17 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

1/20/06

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 16 do not set forth any active steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3, 8, 10, 11, 13-16 and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Bultman et al. (US 6,829,559).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C.

102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

In re claim 1, Bultman et al. inherently teach a computer-implemented method for correlating, by comparing, a backside defect detected on a specimen with a frontside defect detected on a specimen if a portion of the backside defect on a backside of the specimen is opposite to a portion of the frontside defect on a frontside of the specimen.

This is because Bultman et al. teach detecting a presence of defects on front 40a and back 40b sides of a specimen 40 (i.e. a wafer) by directing energy source 44 toward a front side 40a and a back side 40b of the specimen 40 simultaneously (**Fig.12**) to detect the presence, a number, a location and type of defects on the front side 40a with respect to the back side 40b (**col. 70, lines 18-25; col. 78, lines 22-30; col. 86, lines 33-40 and col. 135, lines 20-23**); the determined properties (i.e. the presence, the number, the location and the type of defects, **col. 86, lines 37-40**) are sent back to the process 54 (**Fig.12**) for **comparing the determined properties of the specimen** (**col. 72, lines 19-33**, col. 135, lines 12-23).

With the comparisons of the presence, the number and the locations of the frontside defects and the backside defects detected on the specimen 40, it would be able to **correlate or show a relationship** between the frontside defects and the backside defects and thus to distinguish if a portion of the backside defects is opposite to a portion of the frontside defects (e.g. if the frontside defects are the mirror image of the backside defects or the frontside defect pattern is similar to the backside defect pattern) because Bultman et al. teach **detecting** the frontside defects and the backside defects (**col. 70, lines 18-25; col. 78, lines 22-30**) followed by **comparing** the defect data from the frontside and the backside (**col. 72, lines 19-33**).

In re claim 3, Bultman et al. teach generating a single visual representation of the specimen that illustrates the backside defect and the frontside defect with different formatting to visually differentiate the backside defect and the frontside defect, i.e. generating charts to illustrate the determined defect data (Fig.10) to differentiate the defects from the frontside and the backside.

In re claim 8, Bultman et al. also teach comparing coordinates defining a location of the backside defect with coordinates defining a location of the frontside defect to determine if the portion of the backside defect on the backside of the specimen is opposite to the portion of the frontside defect on the frontside of the specimen because Bultman et al teach comparing the defects from the frontside and the backside in term of defect location, as stated in the rejection against claim 1.

In re claims 10, 11 and 13, Bultman et al. also teach classifying the backside defect, i.e. categorizing the presence, the number and the type of the defects on the backside (col. 70, lines 18-25) and determining the root cause of the backside defect from the data representing processing history of the specimen, e.g. to determine if the backside defects are processing related (col. 65, lines 60-66) or a signature related, wherein the signature refers to repeatable defect pattern generated by processing tool (col. 48, lines 13-17 and 30-34).

In re claim 14, Bultman further inherently teach classifying the backside defect, such as categorizing the presence and the type of the defect; and altering a parameter of a process tool in response to the classification, since Bultman et al. disclose altering the parameter of an instrument coupled to a process tool such as a semiconductor fabrication process tool in response to one of the determined properties of the specimen (col. 74, lines 16-20) and altering a configuration of component 50 of the system 32 (Fig.12) in classifying the defect (col. 52, lines 9-12).

In re claim 15, Bultman et al. inherently teach altering a parameter of a process tool in response to the backside defect to reduce occurrence of the frontside defect on additional specimen processed I the process tool, since Bultman et al. disclose altering the parameter of an instrument coupled to a process tool such as a semiconductor fabrication process tool in response to one of the determined properties of the specimen (col. 74, lines 16-20) and altering a configuration of component 50 of the system 32 (Fig.12) in classifying the defect (col. 52, lines 9-12). By correlating or comparing the frontside defect and the backside defect (col. 72, lines 19-33, col. 86, lines 33-46, col. 135, lines 12-23) and thus altering the parameter of the processing tool to correct problems in the processing tool, the occurrence of the defects is expected to reduce.

In re claims 16 and 19, Bultman et al. also teach correlating the backside defect detected on the backside 40b of a specimen 40 with a front-side defect detected on the front-side 40a of the specimen 40 (col. 65, lines 22-23 and 50-52, col. 68, lines 40-45) if the backside defect and the front-side defect satisfy one or more proximity criteria, i.e. a predetermined range (col. 68, lines 44-45) or a critical dimension of the specimen (col. 53, lines 8-10).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3, 8, 10-16, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wooten et al. (US 6,156,580).

In re claim 1, Wooten et al. teach a computer-implemented method (col. 1, lines 47-48), comprising using laser to **inspect** both front-side defects and back-side defects of a wafer (col. 1, lines 55-60) and col. 5, lines 48-51); and downloading the front-side and back-side inspection data to a microscope review station 110 (col. 1, line 63 through col. 2, line 3 and col. 2, lines 14-23) to **review** the front-side defects and the back-side defects to **determine** if these defects present certain **coordination** (col. 3, lines 59-61 and col. 4, lines 14-16) and thus to judge if the wafer is acceptable (col. 4, lines 17-19).

Although Wooten et al. do not expressly teach correlating a back-side defect with a front-side defect detected a specimen, one of the ordinary skill in the art would have comprehended that by **reviewing** the front-side and back-side defects and **coordinating** the front-side and back-side defects it would imply determining a qualitative and/or quantitative **correspondence or relationship** between the front-side defect and the back-side defect. This is because "correlating a back-side defect detected on a specimen with a front-side defect detected on the specimen" can be broadly and reasonably interpreted as finding a relationship between the front-side defects and the backside defects via reviewing and coordinating the front-side and backside defects. Finding the relationship would involve determining if a portion of the backside defect is opposite to a portion of the front-side defect and/or if a portion of the backside defect matches a portion of the front-side defect. In other word, while **claim 1 does not set forth any method steps on how to "correlating" defects**, at least the steps of reviewing and coordinating the front -side and the back-side defects as taught by Wooten et al. can be broadly and reasonably interpreted as "correlating" because reviewing and coordinating steps would involve finding a certain relationship between two entities, which is nothing but "correlating."

In re claim 2, one of the ordinary skill in the art would have comprehended that by reviewing the front-side and back-side defects it would able to determine the relationship between the front-side defect and the back-side defect, including to see if a portion of the back-side defect matches or aligns a portion of the front-side defect.

In re claim 3, Wooten et al. teach generating a single visual representation of the specimen by transmitting the inspection defect data to the microscope review station to generate a visual representation for visual review (col. 4, lines 13-19 and col. 2, lines 14-23).

In re claims 8 and 10, Wooten et al. also inherently teach the limitations because the foregoing coordinating step would comprise "comparing coordinates defining a location of the back-side defect with coordinates defining a location of the front-side defect" and by the coordinating and reviewing steps as taught by Wooten et al. it would also able to determine if a portion of the back-side defect is opposite to a portion of the front-side defect and classify the defects, e.g. to see if the defect patterns are point-defect or line-defect or irregular shape defects via the microscope view station as taught by Wooten et al.

In e claims 11 and 13, one of the ordinary skill in the art would have been motivated to use Wooten's teachings to classify the defects, as stated in the rejection against claims 8 and 10, and further to determine a root cause of the back-side defect (e.g. unwanted debris or contaminants) from data representing process history of the specimen since the microscope view station as taught by Wooten et al. obviously is capable of classifying and analyzing the defect data.

In re claim 12, one of the ordinary skill in the art would have been motivated to use Wooten's teachings to classify the defects, as stated in the rejection against claims 8 and 10, and to determine parameters for the classifying, i.e. by analyzing and categorizing the defect pattern as the determining parameters.

In re claims 14 and 15, one of the ordinary skill in the art would have been motivated to use Wooten's teachings to classify the back-side defect and altering a parameter of a process tool in response to the classification or to the back-side defect to reduce occurrence of the front-side defect on additional specimen, i.e. altering the parameter (i.e. position) of a process tool, such as wafer inverters 114 and 116, in the microscope review station 110) in response to the classification or to the back-side defect to reduce occurrence of the front-side defect.

In re claims 16 and 19, one of the ordinary skill in the art would have been motivated to use Wooten's teachings to correlate a back-side defect detected on a back-side of a specimen with a front-side defect detected on a front-side of the specimen, as stated in the rejection against claim 1, and thus to see if the back-side defect and the front-side defect satisfy one or more proximity criteria, i.e. a criteria for selecting the wafer having certain characteristics in the specimen (col. 6, lines 25-29).

7. Claims 2, 4, 12, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bultman et al. (US '559).

In re claim 2, one of the ordinary skill in the art would have recognized that Bultman et al. inherently teach the claimed limitations because Bultman et al. utilize optical component 48, which is along an axis and perpendicular to the frontside 40a and the backside 40b of the specimen 40, to detect the frontside defects and the backside defects from the frontside 40a and the backside 40b, respectively. By comparing the detected defect data, one would be able to identify if the portion of the backside defect is aligned with the portion of the frontside defects since whether or not align is a part of work during the comparison.

In re claim 4, Bultman et al. teach that the processor 54, which received defect data detected from the specimen (Fig.12), can be used to determine a " fingerprint" or "signature" of defects (col. 48, lines 30-32), wherein the signature refers to a property of a repeatable pattern feature on a specimen (col. 48, lines 12-19 and 30-36).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to identify data representative of a signature (i.e. the repeatable pattern feature) of a chuck of a process tool (e.g. a wafer handler) within defect data generated during detection of the backside defect; and removing the data representative of the signature of the chuck from defect data generated during detection of the backside defect prior to correlating. See col. 58, lines 5-10 and col. 55, lines 58-61. The motivation/suggestion for doing so is to remove the repeatable pattern feature (i.e. a signature of a chuck of a process tool), which is a noise with respect to backside defect data, from the backside defect data to obtain a true backside defect data.

In re claim 12, one of the ordinary skill in the art would have been motivated to use Bultman's teachings to classify the backside defects (i.e. categorizing the backside defect as a random pattern or a repeatable pattern) and determining parameters (e.g. such as random pattern or a repeatable pattern or line scratch or hot spot) for classifying frontside defect from the classification of the backside defect because the foregoing limitations are part of work during comparing the frontside defects and the backside defects.

In re claims 20-21, Bultman et al. also inherently teach analyzing data representing spatial characteristics of backside defects detected on a specimen to classify the backside defects and determining if data generated during detection of the backside defects is representative of a signature of a chuck of a process tool. This is because Bultman et al. teach detecting the spatial signature characteristics (i.e. a unique defect pattern), including the presence, the number and the type of the frontside and backside defects, as stated previously; and also teach determining a " fingerprint" or "signature" of a chuck of a process tool, as stated previously.

Therefore, with Bultman's teachings one of the ordinary skill in the art would be able to analyze data representative spatial characteristics of backside defects followed by determining the signature of the processing tool in order to remove the signature of the processing tool from the backside defect data since by this manner it would able to filter out the data noise and thus to obtain true backside defect data.

Allowable Subject Matter

8. Claims 5-7, 9, 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record neither teaches nor suggests *altering* one of the visual representations such that the altered visual representation appears as a *mirror image* of the one visual representation, and *superimposing* the altered and the unaltered visual representations to generate an overall visual representation of the specimen (claim 5); and defining the backside defect as a *geometrical figure* having lateral dimensions *larger than* the backside defect, wherein the one or more proximity criteria are satisfied if at least a portion of the geometrical figure is opposite to at least a portion of the frontside defect (claim 17).

Response to Arguments

10. Applicant's arguments filed 11/16/2005 have been fully considered but they are not persuasive for the reasons as follows.

Regarding 112-second paragraph rejection, applicant asserted that claims 1 and 16 recite a correlating step and is not indefinite. (third paragraph, page 5 of the arguments)

The examiner disagrees because claims 1 and 16 do not recite any positive steps on **how** to correlating frontside defect and the backside defect. For example, the positive steps can be like : (1) detecting the frontside defect and the backside defect using a light source; (2) reviewing or comparing the defect pattern of the frontside defect and the backside defect on a microscope station; and (3) correlating the defect pattern of the frontside defect and the defect pattern of the backside defect along a predetermined axis perpendicular to the surface of the specimen to determine if the defect pattern of the frontside defect is a mirror image of the backside defect.

Applicant argued that " the cited art does not teach correlating a backside defect detected on a specimen with a front-side defect detected on the specimen." (last paragraph on page 6 of the arguments)

In response to the foregoing argument, it is submitted that claims 1 and 16 **do not define how to perform the correlating step**, i.e. do not recite any active steps on how to "correlating." Therefore, the "correlating" " can be broadly and reasonably interpreted as finding a relationship between the front-side defects and the backside defects via reviewing and coordinating the front-side and back-side defects, as taught by Bultman et al. In this regard, Bultman et al. teach **correlating** defects information from the frontside and the backside of the specimen **by comparing** the determined properties from the frontside and the backside or **determining relationship** between the determined properties, as stated previously.

Regarding the "comparing", applicant maintained that "Bultman does not teach comparing determined properties on both the frontside and the backside of the specimen." (second paragraph on page 9 of the arguments).

The examiner disagrees. Bultman et al. expressly teach detecting the frontside defect and the backside defect of the specimen, in terms of the presence, the number and the location of defects, by directing an energy source 44 toward a front side 40a and a back side 40b of the specimen 40 simultaneously (**Fig.12; col. 70, lines 18-25; col. 78, lines 22-30; col. 86, lines 33-40 and col. 135, lines 20-23**). The determined properties (i.e. the presence, the number, the location and the type of defects, **col. 86, lines 37-40**) are sent back to the process 54 (**Fig.12**) for **comparing the determined properties of the specimen** (**col. 72, lines 19-33**, col. 135, lines 12-23). Therefore, the rejections based on Bultman's teachings are proper.

In addition, applicant's arguments with respect to Nichani reference have been considered but are moot in view of the new ground(s) of rejection using Wooten reference.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (7:30 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-ming Lee
Primary Examiner
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Jan 20, 2006

HSIEN-MING LEE
PRIMARY EXAMINER

1/20/06